WS14.1 Day-time variability and short term effect of chest physiotherapy on multiple breath nitrogen washout in children with cystic fibrosis

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Objectives: Multiple breath nitrogen washout (N_2MBW) is increasingly used in clinical and research studies world-wide to measure ventilation distribution inhomogeneity (VI) and peripheral airway involvement in patients with Cystic Fibrosis (CF). Chest physiotherapy (CPT) is an integrated part of daily CF treatment used to clear the airways of mucus. The short-term effects of CPT on VI are unknown. The present study aimed to determine day-time variability and short-term effects of CPT on VI measured by N_2MBW in children with CF.
Methods: Prospective, controlled, intervention study of 10 randomly selected children with CF performing N_2MBW, morning and afternoon on 3 visits one month apart. Patients performed extensive CPT supervised by a physiotherapist immediately before $N_2MBW_{afternoon}$ at visit 2 and immediately before both $N_2MBW_{morning}$ and $N_2MBW_{afternoon}$ at visit 3, but refrained from CPT on other occasions. All patients were clinically stable at measurements.
Results: Eight of 10 children with CF [mean age 10.5 years (SD = 2.9)] performed all repeated N_2MBWs. Neither CPT nor time of day affected N_2MBW outcome values. For the primary outcome Lung Clearance Index [mean 9.45 (SD = 1.91)], Δmorning–afternoon was 0.16, 0.10 and 0.01 (all non-significant) at visit 1, 2 and 3 respectively.
Conclusion: In this study CPT showed no short-term effects on any N_2MBW outcomes, supporting previous findings. Additionally, timing of measurement did not affect N_2MBW and may thus be ignored. Our results are relevant when designing and interpreting future longitudinal studies.

WS14.2 Tolerability of inhaled dry powder Bronchitol (mannitol)

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Objectives: The phase III trial of inhaled dry powder Bronchitol showed sustained, clinically meaningful benefit in patients with cystic fibrosis (CF) (Bilton, 2011). NICE (2012) have approved Bronchitol as an add-on therapy to best standard care in adults with CF. The aim was to assess the tolerability of inhaled dry powder Bronchitol in adult CF patients.
Methods: A retrospective review of the Bronchitol Inhaled Dose Assessments (BIDA) completed March 2013 to January 2014.
Results: 52 BIDAs were completed over 11 months. The median (range) age was 28 (17–52) years and median (IQR) FEV_1 1.4 (1.12–2.16) L, 44 (30–50) % predicted. 4 (7.6%) patients failed the assessment, 3 with drop in spirometry and 1 with excessive coughing. Of those who passed the BIDA (n = 48), 7 (15%) stopped taking Bronchitol due to either tightness (n = 5), adherence (n = 1) or feeling no improvement (n = 1). 32 patients had improved median FEV_1 from 1.47 to 1.6 after 6 weeks of taking Bronchitol, but this was not statistically significant (p = 0.56). 18 patients completed the BIDA during a hospital stay for an infective exacerbation and all passed the BIDA. 14 patients had a FEV_1 at the start of the BIDA of <30% predicted, 1 BIDA fail, 17 had FEV_1 30–50% predicted, 1 BIDA fail, and 21 had FEV_1 >50% predicted, 2 BIDA fails.
Conclusion: Bronchitol was well tolerated in our adult CF patients, 92% of patients passed the BIDA. In the small subgroups of exacerbators or those with severe lung function impairment there was no evidence of a higher failure rate however further investigation with greater numbers of patients is warranted.

WS14.3 UK use of bronchial challenge for new therapies

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Introduction: Best practice guidelines indicate that CF patients starting new nebulised medication should first undergo a bronchial challenge (BC) test (including pre and post spirometry), for safety reasons to prevent unacceptable side-effects, and to prevent the dispensation of costly therapy which will not be used. Despite these recommendations, we had the impression that there was a wide variation in the use of BC tests. We therefore undertook a survey to identify current UK practice.
Method: A structured on-line survey was circulated via the CF Physiotherapy National Group, representing UK-wide Regional and Network Care CF Units, asking about the use and nature of new therapy BCs.
Results: Of 49 respondents, 33 were Regional Units, 13 Network Care, and 3 others. Eighteen cared for adults, 21 for children, and 10 both age groups. Overall, 40 (83%) always performed BC, 10 (11%) sometimes, but 3 (6%) never carried them out. BC was carried out by physiotherapists (65%) or CF nurses (25%), with respiratory nurses and others performing the remainder. As regards tests performed, 45 (92%) carry out pre and post spirometry (44 considered a 10% fall as significant), 31 (63%) auscultate, 31 (63%) monitor oxygen saturation, and 23 (47%) routinely pre-bronchodilate. Challenge tests are carried out for inhaled antibiotics at 41 units (84%) and hypertonic saline in 47 (96%).
Conclusion: While most CF units carry out BCs (the majority done by physiotherapists), some do not follow this best practice, which has implications for patient safety and the correct use of often costly therapy. Further educational work needs to be done to improve this important aspect of CF patient care.

WS14.4 Analysis of expiratory flow rates used in autogenic drainage. Are they sufficiently high to mobilize secretions?

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Autogenic Drainage (AD) is based on the use of expiratory airflow to mobilize secretions proximally. These rates need to exceed 30–60 L/min in order to mobilize secretions. However, no-one has examined whether this rate is met while performing AD.
Objective: To examine expiratory flow rates used during coughing, huffing and AD.
Methods: 14 CF patients, aged 13–18 years who were familiar with performing AD were enrolled in the study. Peak Expiratory Flow Rates (PEFR) were measured using a Peak Flow meter during a cough, huff, and the unsticking, collecting and evacuating phases of AD. A mean of 3 measurements was taken for each parameter. This was then compared to their FVC, FEV_1 performed by standard methods.
Results: PEFR L/min produced with a cough was less than that produced by huffing, but did not reach clinical significance (203±164.6 vs 249±160.2). This is consistent with the work by McCarren [1]. The PEFRs increased significantly with each level of AD, unsticking phase = 47.7±17, collecting phase 85±28.6, evacuating phase 115±31.7. Thus the required PEFR was reached at all levels. The PEFR with huffing was significantly higher than with any phase of AD (P = 0.03), but coughing did not significantly increase PEFR >AD. There was no correlation between PEFRs with AD and FEV_1 (FEV_1 median 2.8 L, range 1.93–3.76).
Conclusion: AD generates sufficiently high PEFRs to mobilize secretions proximally. Cough does not improve PEFRs >AD, whereas huffing does. Flow rates generated by AD were not dependent on FEV_1, but rather on what patients felt was effective.

Reference(s)

[1] McCarren B, Alison JA. Physiological effects of vibration in subjects with cystic fibrosis. Eur Respir J 2006; 27: 1204–9.